BIOLOGY AND SUBGENERIC PLACEMENT OF *OSMIA PIKEI* (HYMENOPTERA: MEGACHILIDAE)[1]

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ABSTRACT: *Osmia pikei* nests were obtained from trap nests located on downed, dead trees. Cells were placed in a linear series separated by mud partitions. Pollen provisions were of *Arctostaphylos* (Ericaceae) or *Ribes* (Saxifragaceae) pollen, with some Brassicaceae pollen. Bees overwinter as adults in the nest.

Based on sex association and morphology, *Osmia pikei* is placed in the subgenus *Monilosmia*.

The field biology of *Osmia pikei* Cockerell was determined from 14 nests collected over a three year period from Little Valley, Washoe Co., Nevada. *Osmia pikei* is a very distinctive species within the genus in North America. The mandibles and hamate bristles on the fore tarsus of the female and the tridentate mandibles and shape of the genitalia in the male permit easy identification (Sandhouse 1939). It is found on higher elevations in western North America, from British Columbia to California and eastward to Wyoming and Colorado (Sinha and Michener 1958).

Little Valley is located 27.3 km (17 miles) south-southwest of Reno, NV, along the eastern edge of the Sierra Nevada escarpment at an elevation of 2,000 m and is a portion of an approximately 1,200 hectare natural area controlled by the University of Nevada, Reno. The area is characterized as a mid-elevation Sierran montane meadow complex. Dominant trees are jeffrey pine, *Pinus jeffreyi* Grev. and Balf., and lodgepole pine, *Pinus murravana* Grev and Balf. (Pinaceae), with quaking aspen, *Populus tremuloides* Michx. (Salicaceae) in the wetter areas. Forested areas are interspersed with extensive meadows of grasses, sedges, and herbs. Drier meadow areas contain fewer grasses and large populations of mulesears, *Wyethia mollis* Gray, balsam root, *Balsamorhiza sagittata* (Pursh) (Asteraceae), and shrubs of bitter brush, *Purshia tridentata* (Pursh) (Rosaceae), tobacco brush or snowbrush ceanothus, *Ceanothus velutinus* Dougl. (Rhamnaceae), and greenleaf manzanita, *Arctostaphylos patula* Green (Ericaceae). Growing season begins in May and depends on the amount of the winter snow pack. The season typically extends until mid-

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September with the potential of a frost during any month.

METHODS AND MATERIALS

Trap nests (18 X 18 X 150 mm pine) with drilled holes of 4, 6, 8 and 11 mm diameter, and approximately 130 mm deep were placed in the valley area in 1980, 1981, and 1983. Approximately 1,000 nests were placed annually in selected areas. Nests were opened in the laboratory where measurements and pollen slides were made and bees, parasites and predators were reared.

RESULTS

Nest Placement. All 14 *O. pikei* nests were from trap nests placed on top of large ($\geq$ 60 cm diameter) downed, barkless trees in some state of decay. The trees were all located in dry meadow areas. Eight nests were from the same location with 3, 2, and 3 nests taken in the three years. The remaining 6 nests were from three other areas in the valley.

Nest Architecture. *Osmia pikei* constructed nests of mud partitioned cells in linear series in the bottom of existing holes. Eight nests were in 4 mm holes and six in 6 mm holes. Cells per nest averaged 6.5 $\pm$ 3.1 (S.D.) and ranged from 3 to 14 with 46 cells from the 4 mm holes and 45 from the 6 mm holes. The last finished cell (outermost in hole) was followed by one or two open cells averaging 27.2 $\pm$ 14.9 mm long; 9 nests contained 2 open cells. Nests were plugged at the nest opening in all but one nest. Female cells averaged 9.0 $\pm$ 1.6 mm (n = 23, range 7-12 mm) and male cells averaged 8.0 $\pm$ 1.3 mm (n = 18, range 6-10 mm) long. In eleven nests the first cell (innermost in hole) was a female, in 2 nests the second cell was a female, and in 1 nest the first cell was a male.

Cell Partition and Nest Plug. Cell partitions were constructed of mud and small pebbles (2 to 2.5 mm). Centrally, partitions were 0.3 to 0.5 mm thick and along edges they were 1.0 to 1.2 mm thick. The inner surface was rough and the spiral construction pattern was visible while the outer surface was smooth and concave. Partitions were easily broken when teased with a needle. Nest plugs and open cell partitions were thicker (2.5 to 4.0 mm) and composed of compacted mud and small pebbles.

Provision. The pollen nectar mass was whitish-yellow in color and fairly dry but not crumbly. It was located posteriorly in the cell against the cell partition and filled 1/3 to 1/2 of the cell. The anterior surface sloped dorso-ventrally giving the surface a slant. Analysis of pollen from 10 nests (59 cells) showed 4 nests (19 cells) with 100% *Arctostaphylos patula*

pollen, 2 nests (10 cells) with 100% *Ribes* spp. (Saxifragaceae) pollen, 1 nest (6 cells) with a mixture of *Ribes* and *Arctostaphylos* pollen, 3 nests (17 cells) with 85 to 99% *Arctostaphylos* pollen and minor percentages of unidentified Brassicaceae (*Arabis, Descruainia* or *Draba*) pollen.

Egg Placement. Eggs were laid on the anterior surface of the pollen mass with the posterior ends embedded and the anterior ends free of the pollen mass. Embedding scars were clearly visible on masses where the eggs failed to hatch.

Fecal Material. Feces of *Osmia pikei* were whitish yellow to tan and ranged from 0.7 to 0.8 mm long and from 0.2 to 0.3 mm wide. They were cylindrical and without surface grooves or ridges. Most of the pellets were packed into the anterior end of the cell and held there by the cocoon; some pellets were found in the posterior.

Cocoon. The cocoon was thin, translucent and parchmentlike and had an anterior collarlike spacer that was easily removed from the rest of the cocoon. Under the collar was a white, raised, anterior nipple about 0.1 mm high and 0.7 mm in diameter. Two layers were separable over most of the cocoon surface; the outer was clear with fine (1 μm) white silk threads running through the matrix and the inner was tannish to clear with fewer silk threads in the matrix.

Overwintering. *Osmia pikei* overwinters as an adult in the nest.

Predators, Parasites and Population Structure. Thirty-five percent of the 91 cells examined were destroyed by predators or parasites. *Stelis deprensa* Timberlake (Megachilidae) attacked 15 cells (16.4%). *Dioxys pomonae* Cockerell (Megachilidae) 3 cells (3.2%), *Sapyga angustata* Cresson (Saphygidae) 12 cells (13.1%), and an unidentifiable clerid larva (Cleridae) 3 cells (3.2%) Twelve of the *Stelis* attacks were in the outer two cells of 7 nests, 3 of the *Sapyga* attacks were in outer cells, and 7 attacks in the 3rd or 4th cells. All *Dioxys* attacks were in one nest as was the clerid attack. Of the remaining *Osmia pikei,* 5 (5.4%) died in the egg stage, 9 (9.8%) in the larval stage and 3 (3.2%) in the pupal stage. Adult production was 34 (25.2%) females and 18 (19.7%) males.

DISCUSSION

Osmia pikei females were placed in the subgenus *Centrosmia* (Sinha 1958, Sinha and Michener 1958) and the described male (*Osmia vallicola*) Cockerell) was not assigned. Hurd (1979) correctly identified *O. vallicola* as the male of *O. pikei.* The male described by Sinha and Michener (1958) is not *O. pikei.* We have reared males from trap nests and also from reared material loaned to us by F.D. Parker from another Nevada location (Mustang, Washoe County). *Osmia pikei* is placed in the subgenus

Monilosmia based on morphology. The female's basal mandibular protuberance and hypostomal carina are similar to the following *Monilosima: Osmia pagosa* Sandhouse, *O. rawlinsi* Sandhouse, *O. rostrata* Sandhouse, *O. sculleni* Sandhouse, and *O. simillima* Smith. The mid-tarsal segments, abdominal sterna and genitalia of the male are not similar to the following *Centrosmia: O. bucephala* Cresson or *O. nigriventris* (Zetterstedt) but are similar to these *Monilosmia: O. densa* Cresson, *O. juxta* Cresson, and *O. brevis* Cresson. Both sexes key to *Monilosmia* Sinha 1958.

The correct synonymy for *O. pikei* is *O. pikei* Cockerell, 1907, female and *O. vallicola,* Cockerell, 1907, male. The remaining synonyms given for *O. pikei* (Hurd 1979) are all correctly placed with *Osmia universitatis* Cockerell, 1907,male and include *O. integrella* Cockerell, 1907, male; *O. amala* Cockerell, 1907, male; and *O. metitia* Cockerell, 1909, male. The above is based on the examination of the holotypes.

Biologically, *O. pikei* differs from *O. bucephala* in the use of mud in cell partition and nest plug construction, whereas *O. bucephala* uses double macerated leaf partitions (Krombein 1967). *Osmia pikei* appear not to modify the burrow shape as done by *O. bucephala.* Pollen masses and egg placement appear similar in both species as do the cocoons, except for the lack of an anterior nipple in *O. bucephala.* Both species overwinter as adults in the nest.

Other *Monilosmia* biologies are *Osmia seclusa* Sandhouse (Bohart 1955), *Osmia iridis* Cockerell (Torchio and Tepedino 1982), and *Osmia sculleni* (Parker and Tepedino 1982). These species use existing holes for nests and, unlike *O. pikei,* they use macerated leaf material for cell partitions and nest plugs. *Osmia seclusa* used the main burrows of *Diadasia diminuta* Cresson, a ground nesting bee, and *O. iridis* and *O. sculleni* used drilled trap nests. *Osmia sculleni* modified the existing burrow in elderberry stem trap nests. *Osmia sculleni* fecal pellets differ by possessing an impressed longitudinal line on one side. The cocoons of *O. pikei* and *O. sculleni* are quite similar. *Osmia sculleni* collects boraginaceous pollens and *O. seclusa* collects both *Penstemon* and legume pollens for nest provisions.

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The Commission hereby gives six months notice of the possible use of its plenary powers in the following cases, published in the *Bulletin of Zoological Nomenclature,* volume 42, part 1, on 2 April 1985 and would value comments and advice on them from interested zoologists.

Correspondence should be addressed to the Secretary at the above address, if possible within six months of the date of publication of this notice.

Case No.

2374 *Humerobates* Sellnick, 1928 (Arachnida, Acari): misidentification of the type species *Notaspis humeralis* Hermann, 1804.

1481 *Argyrodes* Simon, 1864 and *Robertus* O. Pickard-Cambridge, 1879 (Arachnida, Araneae): proposed conservation by the suppression of *Argyrodes* Guenee, 1845 and *Ctenium* Menge, 1871.

2484 *Olpium* L. Koch, 1873 (Arachnida, Pseudoscorpionida, Olpiidae): proposed designation of type species and related problems.

2480 *Erigone* Audouin, 1826 (Arthropoda, Araneae): proposed designation of type species.

2491 *Actia* Robineau-Desvoidy, 1830 (Insecta, Diptera): request for designation of type species.

R.V. MELVILLE, Secretary